abnormalities that are caused by the renin-angiotensin-aldosterone effects of the disorder from those that are not.

Standard renal function evaluation techniques that use either technetium Tc 99m pentetic acid (DTPA) (excreted by glomerular filtration) or iodohippurate sodium I 131 or I 123 (excreted primarily by tubular secretion) show a delayed transit time through the kidney and therefore a prolonged excretory phase that results from the renin effect of reducing urine flow on the affected side. When captopril is administered before these tests, there is a substantial drop in the glomerular filtration rate. This affects the ^{99m}Tc-DTPA renogram by dropping the rate of tracer accumulation and the iodohippurate renogram by delaying the transit time (time to peak) and excretion rate half-time owing to the altered dynamics. These changes are not noted in essential hypertension where there is either an increase or no significant change in the glomerular filtration rate. In patients with renovascular hypertension with severely reduced renal function, the magnitude of the change may be reduced, making the test less sensitive. In those with complete renal artery stenosis, although renin production is increased, there is no handling of these radiopharmaceuticals as is to be expected. In nearly complete stenosis, there is also no demonstrable captopril effect, but an iodohippurate study does show the classic retention pattern. In mild stenosis (<50%) there is neither increased renin production nor a captopril effect.

Although large-scale studies using captopril in this manner have not yet been done, the well-defined mechanistic response to angiotensin inhibition should significantly enhance the 80% to 85% sensitivity of standard renograms in identifying renovascular hypertension and differentiating it from essential hypertension and other renal diseases.

JOHN MAX VOGEL, MD
Sacramento, California

REFERENCES

Dondi M, Franchi R, Levorato M, et al: Evaluation of hypertensive patients by means of captopril enhanced renal scintigraphy with technetium-99m DTPA. J Nucl Med 1989; 30:615-621

Fine EJ: General concepts and applications of the scintirenogram in hypertensive disease, *In* Blaufox MD (Ed): Evaluation of Renal Function and Disease with Radionuclides—The Upper Urinary Tract. Basel, S. Karger, 1989, pp 198-235

Kremer Hovinga TK, de Jong PE, Piers DA, et al: Diagnostic use of angiotensin converting enzyme inhibitors in radioisotope evaluation of unilateral renal artery stenosis. J Nucl Med 1989; 30:605-614

Sfakianakis GN, Bourgoignie JJ, Jaffe D, et al: Single-dose captopril scintigraphy in the diagnosis of renovascular hypertension. J Nucl Med 1987; 28:1383-1392

Dacryoscintigraphy Revisited

NASOLACRIMAL DUCT OBSTRUCTION is a frequent cause of epiphora (excess tearing). A diagnostic evaluation is required to rule out other common causes of epiphora such as lower lid horizontal laxity or conjunctival inflammation. A proper diagnosis is essential because the traditional treatment of nasolacrimal duct obstruction is surgical correction. Recently a new technique has been described that uses a balloon catheter—like doing coronary angioplasty—to dilate the nasolacrimal duct. This has stimulated a renewed interest in a physiologic assessment of nasolacrimal duct patency.

Two office procedures may be done to evaluate nasolacrimal duct obstruction: irrigation of the lacrimal system and dye testing. Nasolacrimal duct obstruction may be diagnosed when there is complete obstruction to irrigation of the lacrimal system at the level of the nasolacrimal duct. In many patients with epiphora, however, there is no physiologic drainage of tears through the nasolacrimal duct, but forceful irrigation through the nasolacrimal duct may be accomplished (functional nasolacrimal duct obstruction). Functional nasolacrimal duct obstruction may be diagnosed by placing fluorescein dye in the eye and a cotton swab in the nose to recover the dye. This test has been criticized as unreliable because of problems recovering the dye in the nose of some patients.

The tearing process was first studied with radioisotopes in 1973. A major difference between a radionuclide dacryocystogram and an x-ray contrast dacryocystogram is that the radionuclide study is physiologic and better depicts the natural flow of tears. The study consists of placing a drop of technetium Tc 99m pertechnetate in the conjunctival space and imaging the passage of the labeled tears into the nose. X-ray dacryocystography, on the other hand, requires canalization of the nasolacrimal duct and the administration of contrast using pressure, which can mask the anomaly.

Recently 16 patients were studied before balloon dilatation of the nasolacrimal duct. In each case the dacryoscintigram showed the obstruction. In addition, the site of obstruction along the nasolacrimal path was found and the degree of obstruction was apparent. Dacryoscintigraphy is thus a useful diagnostic test to evaluate patients with epiphora and suspected functional nasolacrimal duct obstruction.

KENNETH P. LYONS, MD
BRUCE BECKER, MD
KENNETH ASHTON, MD
Long Beach, California

REFERENCES

Carlton WH, Trueblood JH, Rossomondo RM: Clinical evaluation of microscintigraphy of the lacrimal drainage apparatus. J Nucl Med 1973; 14:89-92

Von Denffer H, Dressler J, Pabst HW: Lacrimal dacryoscintigraphy. Semin Nucl Med 1984; 14:8-15

Radiolabeled Monoclonal Antibodies for Detecting and Treating Cancer

THE USE OF MONOCLONAL ANTIBODIES offers a new procedure, called immunoscintigraphy, for detecting and treating cancer. The basic concept is to use monoclonal antibodies as a carrier to transport the radionuclide to the tumor sites, using the mechanism of the binding of antibody to the site of antigen. When antibodies are labeled with γ-ray-emitting radionuclides, such as technetium Tc 99m and others, they can be used to detect primary and metastatic lesions. The antibodies can also be labeled with β-ray-emitting radionuclides such as iodine 131 and others and be applied for treatment.

Radioimmunoscintigraphy is successfully used to detect solid tumors including melanoma; hepatocellular carcinoma; neuroblastoma; carcinomas of the breast, prostate, colorectum, lung, and ovary; and nonsolid tumors such as B-cell and T-cell lymphomas. In our experience, ^{99m}Tc-anti-melanoma antibody provides excellent quality diagnostic imaging with a high tumor-to-soft-tissue ratio. Besides the known lesions that have been identified, there are many unexpected lesions detected with this radiolabeled antibody and later confirmed to be metastatic melanoma lesions. Because of the need to alter treatment plans, the clinical importance of detecting unexpected sites cannot be overemphasized. This melanoma antibody is currently under the review of the Food and Drug Administration and is expected to be approved this year. Other antibodies such as those of lymphoma, breast cancer, lung cancer, colorectal, and prostate cancer are in the